Combined Sewer Overflow/Stormwater Outfall Investigation Program

PHASE I REPORTING SUMMARY

JUNE 30, 2015

Agenda

- Introduction

- Field Activities Summary

- Data Quality and Usability Assessment

- Data Evaluation Summary

- Conclusions and Recommendations

Introduction

- Phase I Objective
  - Collect and evaluate data to inform selection of the most appropriate sampling approach to quantify contaminants in CSO/SWO particulate and dissolved fractions

- Side-by-side comparison of three sampling approaches
  - High-solids mass (HSM)
  - Low-solids mass (LSM)
  - Whole water (WW)

- Samples collected from Clay Street CSO in Newark, New Jersey (2 events)

Reports

- Data Quality Usability and Assessment Report
  - Submitted August 22, 2014

- Phase I Evaluation/Recommendation Report
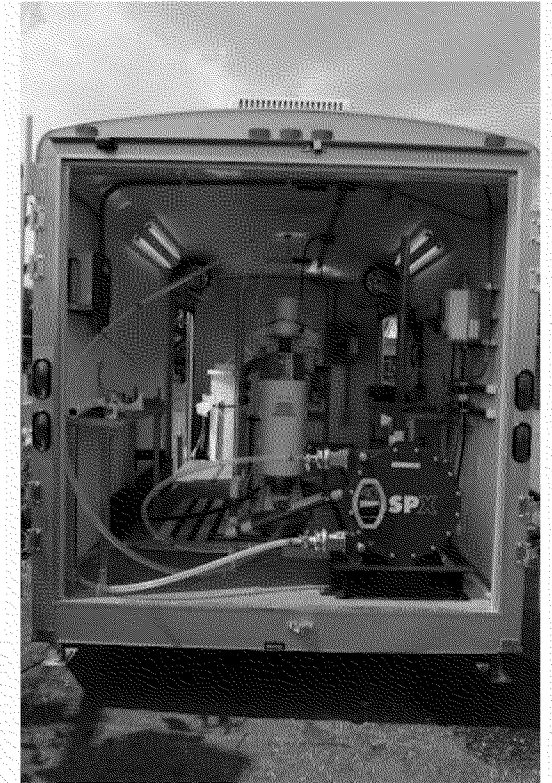 - Submitted October 10, 2014

Summary of Field Activities

Sample Collection System

- Enclosed trailer containing collection tanks, pumps, continuous flow centrifuge, and tubing
- Collected all three sample types (HSM, LSM, and WW) simultaneously
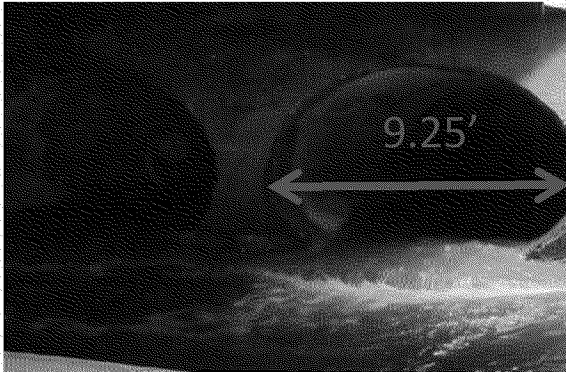- Trailer mobilized to CSO location during rain events
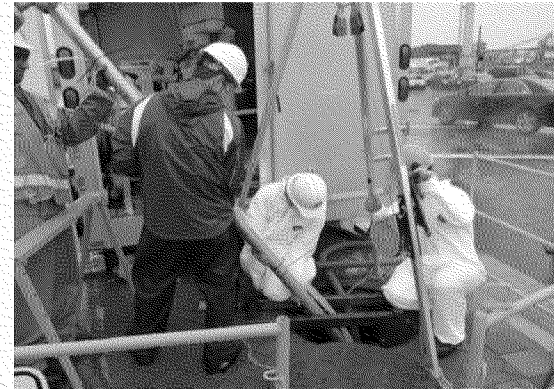

CSO Sampling Trailer

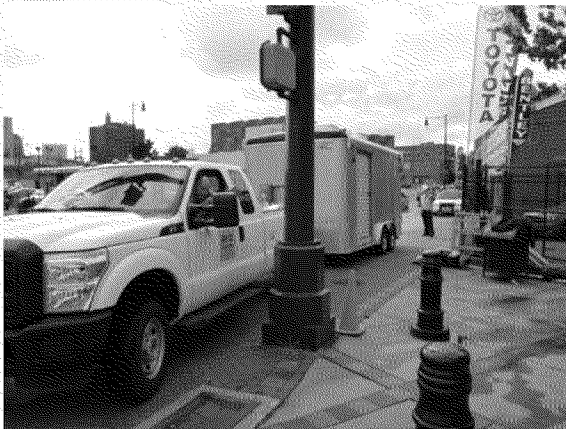**Trailer Components – Centrifuge and Main Pump**

Summary of Field Activities

Clay Street CSO Dual Influent Pipes

Sample Collection – Clay Street

Staging at Clay Street CSO

HSM Particulate Sampling - CFC

Summary of Field Activities

- Mobilization
  - Weather monitoring conducted on daily basis
  - Trigger criteria: forecast of at least 0.2" rain with intensity of at least 0.03" per hour, with no more than 4 consecutive dry hours (during event)
  - Coordinated timing of regulator valve closing with PVSC

- Sample Collection and Processing
  - Two sampling events (~ 6 hours each) at Clay St. CSO between June 2013 and April 2014
  - Multiple attempts needed during each event to collect target mass/volume for all analytical groups using three sampling approaches
  - HSM particulate samples collected in centrifuge bowl and HSM dissolved, LSM, and WW samples collected in bulk sample collection tanks
  - Sample processing conducted at 80 Lister Avenue facility

- Decontamination
  - Between sampling <u>events</u> – full decontamination of non-dedicated equipment and replacement of dedicated equipment
  - Between sampling <u>attempts</u> – full decontamination of non-dedicated equipment and cleaning of dedicated equipment

Data Quality Usability Assessment Report

- Provides a summary of data quality and usability for data collected during Phase I of the CSO/SWO Investigation

- Assessments conducted on verified/validated data

- Evaluations compare data quality to project measurement performance criteria as established in the QAPP (Tierra 2013)

Data Quality Parameter Overview

Data quality parameters are assessed to determine if sample data quality meets the measurement performance criteria

Seven Data Quality Parameters:
- Precision
- Accuracy/bias/contamination
- Overall accuracy/bias
- Sensitivity
- Representativeness
- Comparability
- Completeness

Data Validation Findings

Data validation findings are used to assess both systematic and random data quality issues

Major

- Result has been qualified "R" (rejected)
- Significant QA/QC problems have been identified
- Analysis is invalid
- Result is unusable

Minor

- Validation qualifier other than "R" applied
- Minor QA/QC problems have been identified
- Some level of uncertainty associated with the result reported

Major Findings

- "Extremely poor" internal standard recovery
  - SVOCs
  - VOCs

- "Extremely poor" labeled analog recovery
  - Pesticides

Examples of Minor Findings

- Field blank contamination

- Non-compliant holding time

- Non-compliant relative standard deviation during initial calibration

- Non-compliant field duplicate relative percent difference

- Non-compliant matrix spike/matrix spike duplicate recovery

DQUAR Conclusions

- ## 99% of validated data are usable
  - o Rejected sample results not suitable for project use
    - Internal standard recoveries
      - SVOC – 29 results
      - VOC – 25 results
    - Labeled analog recoveries
      - Organochlorine Pesticides – 7 results
  - o Sample results qualified as estimated are suitable for project use

- ## Achievement of the completeness goals provides sufficient quality data to support project decisions

Data Evaluation Process – 4 Steps

Phase I data evaluated on an analytical group basis for each sampling approach:

1. Implementability of field sampling and processing

2. Data quality and usability

3. Frequency of COPC/COPEC detections

4. Frequency of detections of all analytes

Data Evaluation Process – Implementability (Step 1)

- **Implementability is the ability of each sample collection method to generate the target sample mass/volume for laboratory analysis**

- **Implementation requirements and challenges:**
  - Site access and sidewalk closure permits – may vary by township
  - Police coordination for traffic control and site safety
  - Actual weather conditions did not always match predicted weather conditions
  - Confirming timing of regulator valve closure with PVSC
  - Storm duration – overflow may last less than target duration of 4 to 6 hours

Data Evaluation Process – Implementability (Step 1)

- HSM
  - Most labor-intensive method, potential for sampling equipment breakdown
  - Generated sufficient solids mass and volume required for the target sample analyses (minimum of 2 sampling attempts per event to collect contingency sample mass)

- LSM
  - Less labor-intensive in field than HSM but most labor-intensive in laboratory to generate LSM particulate and LSM dissolved samples
  - LSM bulk sample filtration generated sufficient liquid volume for LSM dissolved but insufficient solids mass for LSM particulate sample in one attempt

- Whole Water
  - Least labor-intensive
  - One successful 6-hour sampling attempt/event needed to generate target sample volume

# Data Evaluation Process – Data Quality and Usability (Step 2)

- Data quality was determined based upon the outcome of data validation

- Data rejected based upon QAPP validation procedures were not considered to be usable

- Datasets for a particular analytical group containing a minimum of 90% usable data were further evaluated

Data Evaluation Process - Data Quality and Usability (Step 2) Example

Collection Method/ Analytical Group	Event/ Attempt	Results Reported	Results Affected	% of Results Affected	% of Usable Results *
HSM Particulate/ Organochlorine Pesticides	Event #1, Attempt #2	28	4	14	86
LSM Particulate/ SVOCs	Event #1, Attempt #2	50	9	18	82

* Dataset Rejected Due to Less Than 90% Usable Data

Data Evaluation Process – Frequency of Detections (Steps 3 and 4)
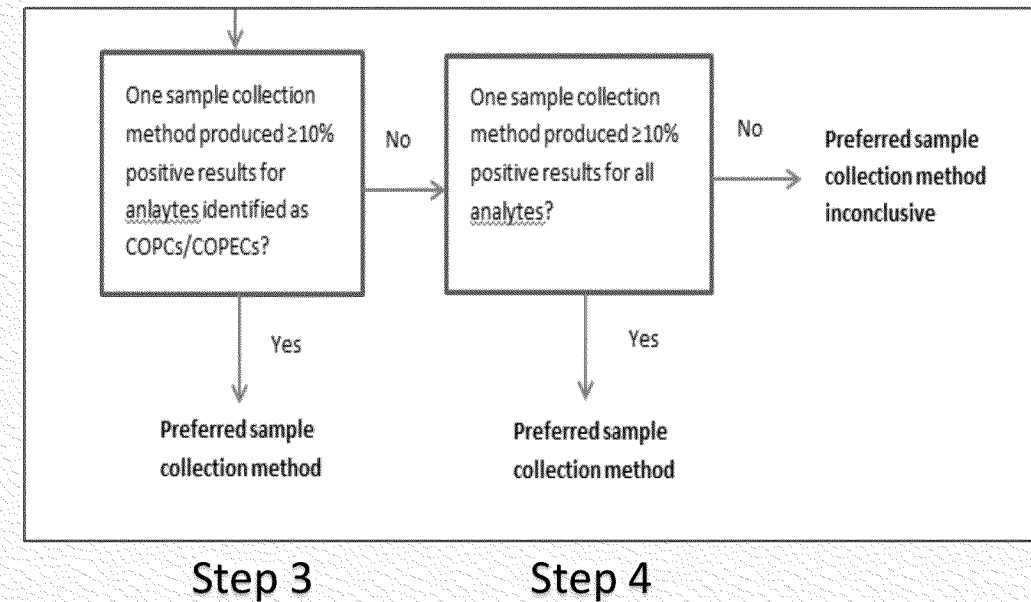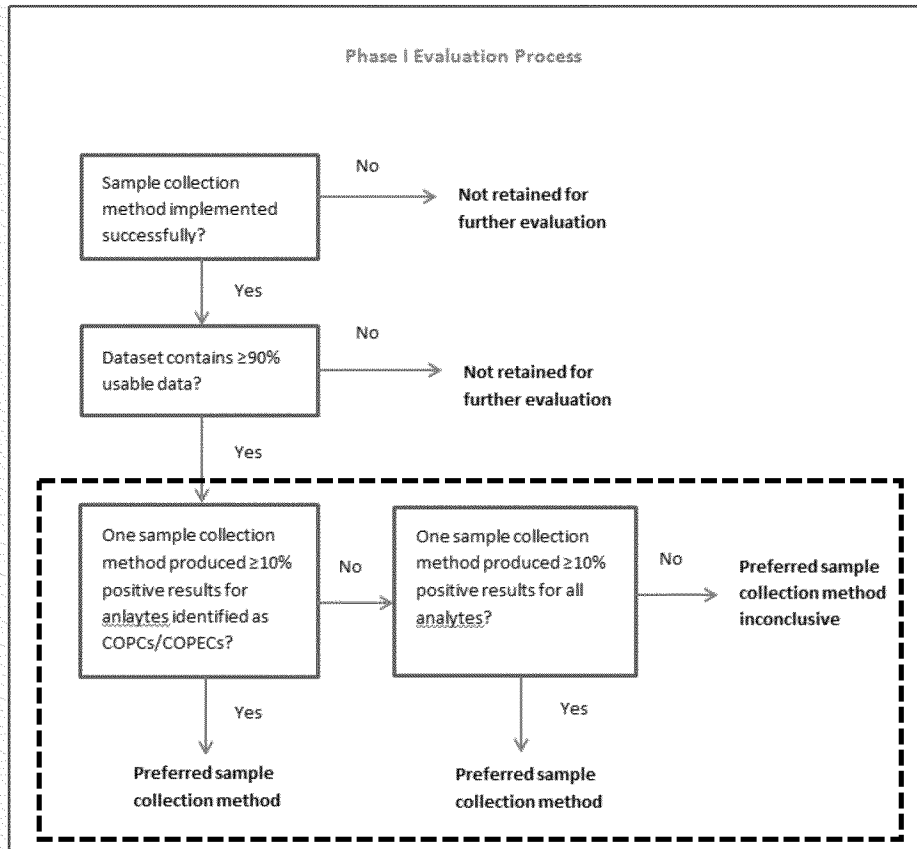
Data Evaluation Process – Steps 3 and 4 Example

Polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans

	Event #1, Attempt #3		Event #2, Attempt #2	
	# of Detects	Preferred Method	# of Detects	Preferred Method
Primary	WW – 14 LSM – 15 HSM – 15	Inconclusive	WW – 7 LSM – 4 HSM – 14	HSM
Duplicate	WW – 13 LSM – 15 HSM – 15	LSM/HSM	WW – 8 LSM – 11 HSM – 15	HSM

Data Evaluation Process Summary

1. Implementability of field sampling and processing - Implementable

2. Data quality and usability – Sufficient to meet Phase I objective

3. Frequency of COPC/COPEC detections

4. Frequency of detections of all analytes

See next slide

Conclusions and Recommendations

Sample Collection Technique	PCDD/PCDF	PCB Congeners	Aroclor PCBs	Organochlorine Pesticides	SVOC	SVOC SIM	Chlorinated Herbicides	Cyanide	VOC	TEPH
LSM										
HSM	☐	☐	☐	☐	O	O	O	O	O	O
WW										

Notes:
☐ = selected sampling method
O = recommended sample collection method inconclusive

- ## Recommend hybrid sampling program for Phase II
  - o Focus on most appropriate sampling method for each analytical group
  - o Iterative approach (additional phases) to collect data and make adjustments to meet project objectives

Questions